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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,465	10/29/2003	Yong-Kuk Jeong	SAM-0477	6009
75	90 12/20/2005		EXAMINER	
Anthony P. Onello, Jr. MILLS & ONELLO LLP			BLUM, DAVID S	
MILLS & ONE. Suite 605	LLO LLP		ART UNIT	PAPER NUMBER
Eleven Beacon Street			2813	
Boston, MA 0	2108		DATE MAILED: 12/20/2005	

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)	
	10/696,465	JEONG ET AL.	
Office Action Summary	Examiner	Art Unit	
	David S. Blum	2813	
The MAILING DATE of this communication Period for Reply	on appears on the cover sheet w	rith the correspondence address	••
A SHORTENED STATUTORY PERIOD FOR F THE MAILING DATE OF THIS COMMUNICAT - Extensions of time may be available under the provisions of 37 of after SIX (6) MONTHS from the mailing date of this communicat - If the period for reply specified above is less than thirty (30) days - If NO period for reply is specified above, the maximum strong of Failure to reply within the set or extended period for reply will, by Any reply received by the Office later than three months after the earned patent term adjustment. See 37 CFR 1.704(b).	ION. CFR 1.136(a). In no event, however, may a ion. s, a reply within the statutory minimum of thi period will apply and will expire SIX (6) MO y statute, cause the application to become A	reply be timely filed rty (30) days will be considered timely. NTHS from the mailing date of this communic BANDONED (35 U.S.C. § 133).	ation.
Status			
1) Responsive to communication(s) filed on 2a) This action is FINAL . 2b) 3) Since this application is in condition for a closed in accordance with the practice un	This action is non-final. Ilowance except for formal ma		ts is
Disposition of Claims			
4) Claim(s) 1-18 is/are pending in the application 4a) Of the above claim(s) is/are with 5) Claim(s) is/are allowed. 6) Claim(s) 1-18 is/are rejected. 7) Claim(s) is/are objected to. 8) Claim(s) are subject to restriction	thdrawn from consideration.		
Application Papers			
9) The specification is objected to by the Example 10) The drawing(s) filed on 29 October 2003 Applicant may not request that any objection Replacement drawing sheet(s) including the control of the co	is/are: a)⊠ accepted or b)☐ to the drawing(s) be held in abeya correction is required if the drawing	nce. See 37 CFR 1.85(a). g(s) is objected to. See 37 CFR 1.12	• •
? Priority under 35 U.S.C. § 119			
12) Acknowledgment is made of a claim for for a) All b) Some * c) None of: 1. Certified copies of the priority documents of the priority documents of the priority documents of the certified copies of the application from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification for the certification from the International Experience * See the attached detailed Office action for the certification for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the International Experience * See the attached detailed Office action for the certification from the Internation for the certification from the Internation from the certification from the certification for the certification from the certification from the certification from the certification from the certif	uments have been received. uments have been received in a e priority documents have been Bureau (PCT Rule 17.2(a)).	Application No n received in this National Stage	;
Attachment(s) 1) Notice of References Cited (PTO-892) 2) Notice of Draftsperson's Patent Drawing Review (PTO-9-3) Information Disclosure Statement(s) (PTO-1449 or PTO/Paper No(s)/Mail Date	48) Paper No	Summary (PTO-413) (s)/Mail Date Informal Patent Application (PTO-152) 	

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This is in response to the amendment filed 9/19/05.

DETAILED ACTION

Claim Rejections - 35 USC § 112

- 1. The following is a quotation of the first paragraph of 35 U.S.C. 112:
 - The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
- 2. Claim1-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 16 (and therefore all dependent claims) contain the limitation "forming a second electrode...without curing the second dielectric layer after forming the second electrode". The specification as originally presented offers no support for this limitation. The specification (page 10 lines 23-25) discloses that the second dielectric layer is deposited without performing an additional curing process. This does not preclude the practice of performing a subsequent curing step, separate or in conjunction with another step. The issue of subsequent curing of the second dielectric layer is not discussed in the instant specification. The subsequent step of forming an electrode of RuO2 or IrO2 by CVD or ALD (page 10 lines 15-20, 30-31) would include an oxidizing atmosphere and is a curing step as taught in Basceri

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(see below). The specification (page 10 lines 23-25) cannot be interpreted as allowing a cure during deposition of the electrode but not after deposition of the electrode but only that the deposition of the electrode does not include a curing step.

Claim Rejections - 35 USC § 103

- 3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
- 4. Claims 1-12 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung (US 6,884,675) in view of Basceri (US 6,673,669).

Chung teaches all of the positive steps of claims 1-12 and 14-18 except for forming a second electrode on the second dielectric layer without curing the second dielectric layer.

Regarding claim 1, Chung forms a first electrode on a semiconductor substrate (column 3 lines 8-9), a first dielectric layer on the first electrode (column 3 lines 8-9), cures the first dielectric layer in an atmosphere containing oxygen (column 5 line 32, ozone curing after Tantalum deposition), depositing a second dielectric layer on the cured first dielectric layer using only a source gas (column 5 lines 34-39, second sequence of tantalum precursors, purge gas, flow of reactant gas). Chung teaches curing the second

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dielectric layer prior to forming the second electrode. Basceri also teaches curing the dielectric layer prior to forming the second electrode, or as an alternate embodiment, depositing the second electrode on an uncured dielectric by depositing the electrode with an oxygen atmosphere or diffusing oxygen through the second electrode after deposition (column 5 line 32-column 6 line 4). Curing the dielectric layer by depositing the electrode with oxygen in the atmosphere reads on the limitation of "without curing the second dielectric layer after forming the second electrode". Basceri teaches these methods better fill oxygen vacancies that would migrate toward the dielectric/electrode interface.

Regarding claim 2, the first dielectric layer is formed using only a source gas without a reactant gas (column 5 lines 35-40, ozone is used to cure the deposited layer).

Regarding claim 3, the first and second dielectric layers are formed by CVD (chemical vapor deposition) (column 5 line 7).

Regarding claim 4, the first and second dielectric layers are formed by ALD (atomic layer deposition) (column 5 line 8).

Regarding claim 5, the source gas includes oxygen (column 4 lines 11-13).

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Regarding claim 6, the first and second dielectric layers are deposited at 100-600 degrees C. (column 3 line 44).

Regarding claim 7, the first dielectric layer is deposited to a thickness of 5-200 A (table I103-244 A) and the second dielectric layer is deposited to a thickness of 5-3000 A (Table I 102-228 A).

Regarding claim 8, the source gas is Ta(OC2H5)5 or Ta(OCH3)5 (column 4 lines 12-13).

Regarding claim 9, the first dielectric layer is formed of Ta2O5 using CVD (column 5 lines 7 and 38).

Regarding claim 10, the second dielectric layer is formed of Ta2O5 using CVD (column 5 lines 7 and 38).

Regarding claim 11, the first and second dielectric layers are deposited in-situ (column 5 lines 13-39), Chung teaches repeating the deposition steps without removal from the chamber or a break in the process, thus it is obvious the two layers are formed in-situ.

Regarding claim 12, the atmosphere containing oxygen is O3 (column 5 line 36, ozone is O3).

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Regarding claim 14, the first electrode is one of Ru, Pt, Ir (column 4 line 37) and the second electrode is TiN or TaN (column 5 line 67-column 6 line 1).

Regarding claim 15, the first and second dielectric layer is Ta2O5 (column 5 line 38).

Regarding claim 16, Chung forms a first electrode on a semiconductor substrate (column 3 lines 8-9), a first Ta2O5 layer is formed on the first electrode (column 3 lines 8-9), cures the first dielectric layer in an atmosphere containing O3 (column 5 line 32, ozone curing after Tantalum deposition), depositing a second Ta2O5 layer on the cured first dielectric layer using only a source gas (column 5 lines 34-39, second sequence of tantalum precursors, purge gas, flow of reactant gas). Chung teaches curing the second dielectric layer prior to forming the second electrode. Basceri also teaches curing the dielectric layer prior to forming the second electrode, or as an alternate embodiment, depositing the second electrode on an uncured dielectric by depositing the electrode with an oxygen atmosphere or diffusing oxygen through the second electrode after deposition (column 5 line 32-column 6 line 4). Curing the dielectric layer by depositing the electrode with oxygen in the atmosphere reads on the limitation of "without curing the second dielectric layer after forming the second electrode". Basceri teaches these methods better fill oxygen vacancies that would migrate toward the dielectric/electrode interface.

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Regarding claim 17, the first Ta2O5 layer is formed using Ta(OC2H5)5 without a reactant gas (column 4 lines 13-14).

Regarding claim 18, the first and second Ta2O5 layers are formed by CVD (chemical vapor deposition) (column 5 line 7).

It would be obvious to one skilled in the requisite art at the time of the invention to modify Chung by forming the electrode upon an uncured (Ta2)5) dielectric as taught by Basceri to better fill oxygen vacancies that would migrate toward the dielectric/electrode interface.

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung (US 6,884,675) in view of Basceri (US 6,673,669) and in further view of Narwankar (US 6,677,254).

Chung and Basceri teach all of the positive steps of claim 13 as recited above in regard to claim 1, except for forming the atmosphere containing oxygen being electron resonance or an RF plasma of O2 or N2O.

Regarding claim 13, Chung is silent as to the source of O3, and Basceri teaches using O2, O3, or N2O, but does not teach electron resonance or an RF plasma as the method of producing the gas (column 5 line 62-column 6 line 4, suggesting thermal heating).

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Narwankar teaches supplying the gas (O2) as a thermal heated operation or in an RF plasma (microwaves column 7 lines 5-20), giving the two heating methods an art recognized equivalence for this operation.

It would be obvious to one skilled in the requisite art at the time of the invention to modify Chung and Basceri by using RF plasma oxygen as taught by Narwankar to be an art recognized equivalent to thermal oxidation for this operation.

Response to Arguments

6. Applicant's arguments filed 9/19/05 have been fully considered but they are not persuasive.

The applicant argues that Chung does not teach or suggest forming a second electrode on the second dielectric layer without curing the second dielectric layer after forming the second electrode. The examiner has not made such a representation. Rather that Chung teaches multiple dielectric layers and that Basceri teaches not curing the top layer prior to deposition of the second electrode with the advantage of better filing the oxygen vacancies. The combination of Chung and Basceri read on the claims (1 and 16) as currently written.

The applicant argues that Basceri does not teach or suggest forming a second electrode on the second dielectric layer without curing the second dielectric layer after

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forming the second electrode. Basceri teaches curing the top dielectric layer either after deposition of the electrode or during the deposition of the second electrode. Curing the dielectric layer during deposition of the second electrode reads on forming a second electrode on the second dielectric layer without curing the second dielectric layer after forming the second electrode. Further, the instant specification teaches forming an electrode of RuO2 or IrO2 by CVD or ALD (page 10 lines 15-20, 30-31). CVD or ALD of RuO2 or IrO2 would include an oxidizing atmosphere and is a curing step as taught in Basceri (curing the dielectric layer in an atmosphere containing oxygen during deposition of the electrode)

The applicant argues that neither Chung nor Basceri teach forming a second electrode on the second dielectric layer without curing the second dielectric layer after forming the second electrode. This argument was answered above in regards to Chung and Basceri individually.

The applicant argues that neither Chung or Basceri teach depositing a second dielectric layer on the cured first dielectric layer without a reactant gas. However, Chung deposits the layers using only a source gas and subsequently curing them. Basceri teaches not curing the top dielectric layer prior to deposition of the electrode.

The applicant argues that Narwankar does not teach or suggest forming a second electrode on the second dielectric layer without curing the second dielectric layer after

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forming the second electrode. Narwankar was not cited for this purpose, but rather to teach a limitation regarding the supply of oxygen in a thermal heated operation.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (571)-272-1687) and e-mail address is David.blum@USPTO.gov.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (571)-272-1702. Our facsimile number all patent correspondence to be entered into an application is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David S. Blum

December 15, 2005